

Answer for the Anonymous Referee #1 Comment on wes-2021-55

Authors appreciate the useful comments from the reviewers and have addressed or given the explanation for all the comments in this revised manuscript. Following is the list of comments and authors response in terms of corrections. Hope you find this useful for acceptance of this manuscript.

The manuscript deals with a comparison between two approaches for estimating the icing effect: a statistical method and CFD.

Although the main idea of comparing such approaches together is interesting, the whole paper seems vague to me.

We appreciate the reviewer attention on the approaches, which we used in this paper to estimating the icing effect. The accuracy of icing model to predict the energy loss through annual energy production (AEP) estimation within three approaches: T19IceLossMethod, CFD and field SCADA, which including statistical method, numerical method and actual wind park measurement. Considering the icing have significant effects for wind park AEP, authors also use the Wind Park Optimizer (wind farm design (WFD) tool) with WindSim that helps to maximize the wind farm profitability by optimizing the wind park layout.

Overall, this paper is the close loop pioneer research work including SCADA, statistical method and numerical method (CFD & WFD) that not published before. The research methodology in this paper could be extended in other wind parks to estimate the icing effects on wind turbine.

- **The goal of the study and the research question is not clearly stated, not in abstract, nor in conclusion and not even in the discussions. It is confusing why the comparison is implemented whether for validating CFD or validating the statistical method? Which method is faster or more efficient to be implemented comparing the accuracy and the computational costs?**

Thank you for reviewer's comment. The goal in this paper is '*This paper describes the comparison of a statistical (T19IceLossMethod) and numerical (Computational Fluid Dynamics, CFD) case study of wind resource assessment and estimation of resultant Annual Energy Production (AEP) due to ice of a wind park in ice prone cold region.*' Which shown in Abstract. The reason why we need this comparison study of the actual wind park in cold region, due to statistical method and CFD is the common and efficient way in wind resource assessment and icing detection. However, each methods have advantage and disadvantage which effects the accuracy, CPU, also the cost for wind farm maintenance. The comparison, combination and optimization of those methods lead a better understanding of the ice accretion process on wind turbine blades with an aim of improving safety and reducing the Capital Expenditure (CAPEX) and Operational Expenditure (OPEX) related to wind turbine operations in the ice prone CC areas. This paper give an case study for better predict the wind turbine ice detection using AEP loss method.

- **The results presentation needs to be improved via further postprocessing. They look more like the raw data in the tables. The only clear message of the paper to me is that the wake loss model is improving the CFD simulation. This is not sufficient for a comparison research. Perhaps the authors have gained more conclusions but the results are not well-organized or classified.**

Thank you for your comment. For the post-processing, even the data is from the raw simulation results, however, the dataset is evaluated and improved already. For example, in Table 5 and Table 6, the three categories of icing events: Class a, Class b and Class c are used as relative production losses due to icing (% of kWh), relative losses due to icing

related stops (% of kWh) and over production hours (% of total hours) respectively. The readers can easily figure out how much ice losses in different turbines and categories, and how many hours of icing events. For author's opinion, considering this paper is focus on the icing topic, the most important factors or effects we have processed in this paper. While, we would also like to improve and notice if reviewer still have concern or suggestion.

- **The text is not smooth to read in addition to many grammatically issues and a vague structure.**

We appreciate the reviewer comment, and if it is possible, please point it straightly. Thank you.

- **My detailed comments are uploaded in the pdf file, where I addressed the specific parts individually. Hope it helps to improve the paper and I believe that the idea of the paper is potential to be developed, but at this stage the research is not prepared to be published. I do not recommend it for publication.**

Thank you for your comments, and authors addressed those Answers in PDF.

Please also note the supplement to this comment:

<https://wes.copernicus.org/preprints/wes-2021-55/wes-2021-55-RC1-supplement.pdf>